

WHAT IS CLAIMED IS:

1. A method for purifying MDA-7 protein from a cell comprising subjecting a cell extract or supernatant comprising MDA-7 protein to affinity chromatography.
2. The method of claim 1, wherein the MDA-7 protein is purified to at least 20% homogeneity and is active.
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3. The method of claim 1, wherein the MDA-7 protein is glycosylated and is the secreted form of the protein.
4. The method of claim 1, further comprising adding a protein carrier to the extract or supernatant before, during, or after subjection to affinity chromatography.
- 10 5. The method of claim 1, further comprising subjecting the affinity-purified MDA-7 protein to anion exchange chromatography, wherein the resulting MDA-7 protein is purified to at least 30% homogeneity and is active.
6. The method of claim 5, wherein the anion exchange chromatography involves a step gradient of salt up to a concentration of 1.0 M.
- 15 7. The method of claim 6, wherein the MDA-7 protein is eluted in a solution with a salt concentration of about 0.9 M to 1.0 M.
8. The method of claim 5, wherein the resulting protein is purified to 50%-70% homogeneity.
9. The method of claim 8, wherein the resulting protein is purified to 70%-90% homogeneity.
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10. The method of claim 9, wherein the resulting protein is purified to at least 90% homogeneity.

11. The method of claim 10, wherein the resulting protein is purified to at least 95% homogeneity.
12. The method of claim 1, wherein the affinity chromatography involves an affinity resin comprising at least one anti-MDA-7 polyclonal antibody.
- 5 13. The method of claim 1, wherein the affinity chromatography involves an affinity resin comprising at least one anti-MDA-7 monoclonal antibody.
14. The method of claim 1, wherein the affinity chromatography comprises contacting the cell extract or supernatant with an affinity resin, washing the resin, and eluting MDA-7 protein from the resin.
- 10 15. The method of claim 14, wherein the MDA-7 protein is eluted with a solution comprising 1 M salt and a pH below 5.0.
16. The method of claim 14, further comprising neutralizing the eluted MDA-7 protein with a buffer.
17. The method of claim 14, further comprising incubating the eluted MDA-7 protein
15 with Protein A.
18. The method of claim 17, wherein the Protein A is coupled or attached to a nonreacting material.
19. The method of claim 1, further comprising subjecting the affinity chromatography-purified MDA-7 protein to size resolution purification.
- 20 20. The method of claim 19, wherein size resolution purification occurs before and/or after anion exchange chromatography.

21. The method of claim 19, wherein size resolution purification involves a protein gel or a size exclusion column.
22. A method for purifying active, glycosylated, secreted MDA-7 protein from a cell comprising:
- 5 a) subjecting a cell extract or supernatant comprising secreted MDA-7 protein to affinity chromatography involving an anti-MDA antibody;
- b) subjecting the affinity chromatography-purified MDA-7 protein to size resolution purification; and,
- c) subjecting the size resolution-purified MDA-7 to anion exchange
10 chromatography.
23. The method of claim 22, wherein the MDA-7 protein is purified to at least 80% homogeneity.
24. Purified MDA-7 protein, wherein the protein is active.
25. The purified MDA-7 protein of claim 24, wherein the MDA-7 protein is purified
15 to at least about 25% homogeneity.
26. The MDA-7 protein of claim 25, wherein the MDA-7 protein is purified to at least about 40% homogeneity.
27. The MDA-7 protein of claim 26, wherein the MDA-7 protein is purified to at least about 50% homogeneity.
- 20 28. The MDA-7 protein of claim 27, wherein the MDA-7 protein is purified to at least about 60% homogeneity.
29. The MDA-7 protein of claim 28, wherein the MDA-7 protein is purified to at least about 70% homogeneity.

30. The MDA-7 protein of claim 29, wherein the MDA-7 protein is purified to at least about 80% homogeneity.
31. The MDA-7 protein of claim 30, wherein the MDA-7 protein is purified to at least about 90% homogeneity.
- 5 32. The MDA-7 protein of claim 31, wherein the MDA-7 protein is purified to at least about 95% homogeneity.
33. A method for treating a cancer patient comprising administering to the patient an effective amount of a pharmaceutically acceptable composition comprising purified secreted MDA-7 protein of claim 24.
- 10 34. The method of claim 33, wherein the MDA-7 protein is active and at least about 80% homogeneous with respect to proteins in the composition.
35. The method of claim 33, further comprising subjecting the patient to radiotherapy or chemotherapy.
36. The method of claim 35, wherein the cancer patient has an epithelial cell cancer.
- 15 37. The method of claim 33, wherein the cancer patient has a melanoma or pancreatic cancer.
38. A method for radiosensitizing a cancer cell comprising administering to the cell an effective amount of an adenovirus vector comprising a nucleic acid encoding MDA-7, wherein the nucleic acid is under the control of a promoter operable in the cell.
- 20 39. The method of claim 38, wherein the cancer cell is an epithelial cell.

40. The method of claim 38, further comprising subjecting the cancer cell to radiation within 72 hours after administration of the adenoviral vector.
41. A method of treating cancer in a patient comprising administering to the patient an NF- κ B inhibitor and a composition comprising either MDA-7 protein or an adenovirus
5 vector comprising a nucleic acid encoding MDA-7 under the control of a promoter.
42. The method of claim 41, wherein the NF- κ B inhibitor is Sulindac.
43. A protein comprising amino acids 100 to 206 of SEQ ID NO:2 and an endoplasmic reticulum targeting sequence.
44. A method for inhibiting or preventing local invasiveness and/or metastasis of
10 cancer in a patient, comprising administering to the patient an effective amount of a pharmaceutically acceptable composition comprising MDA-7 protein, wherein the MDA-7 inhibits or prevents the local invasiveness and/or metastasis of the cancer.
45. The method of claim 44, wherein the cancer is melanoma, non-small cell lung, small-cell lung, lung, hepatocarcinoma, retinoblastoma, astrocytoma, glioblastoma, gum,
15 tongue, leukemia, neuroblastoma, head, neck, breast, pancreatic, prostate, renal, bone, testicular, ovarian, mesothelioma, cervical, gastrointestinal, lymphoma, brain, colon, or bladder.
46. The method of claim 45, wherein the cancer is lung cancer.
47. A method for inhibiting or preventing local invasiveness and/or metastasis of
20 cancer in a patient, comprising administering to the patient an effective amount of a pharmaceutically acceptable composition comprising a polynucleotide encoding an MDA-7 protein, wherein the MDA-7 protein inhibits or prevents the local invasiveness and/or metastasis of the cancer.

48. The method of claim 47, wherein the polynucleotide encoding an MDA-7 protein comprises an expression construct.

49. The method of claim 48, wherein the expression construct comprises an adenovirus vector comprising a nucleic acid, under the control of a promoter, encoding
5 the MDA-7 protein.